

food hoarding behaviour was not observed in the burrows of *M. platytrix* (Table 2).

Burrows of *M. platytrix* had one to two brood chambers (1.3 ±0.5). The mean diameter of the brood chambers was 12.1 ±2.2 cm. The brood chambers were furnished with a bed of pebbles. The present observation is in accordance with the report of Prater (1971). The mean number of individuals in a burrow was 1.1 ±0.3 (male), 1 ±0 (Female), and 3 ±2.1 (litter).

ACKNOWLEDGEMENTS

Our sincere thanks are due to UGC, Hyderabad (Link no. 804/05-UGC-SERO-1804 dated February 2005) for extending financial support. We are thankful to the Principal and Head of the Department of Zoology, Nehru Memorial College (Autonomous), for encouragement and support. We are grateful to the burrow diggers and rodent trappers for their help during our field work.

REFERENCES

- BARNETT, S.A. & I. PRAKASH (1975): Rodents of Economic Importance in India. Arnold Heinemann, New Delhi and London. 175 pp.
- CHANDRAHAS, R.K. & A.K. KRISHNASWAMI (1974): Studies on the ecology of the Indian gerbil, *Tatera indica* Hardwicke in Kolar (Mysore). *Indian J. Med. Res.* 62: 971-978.
- GOYAL, S.P. & P.K. GHOSH (1993): Burrow structure of two gerbil species of Thar desert, India. *Acta Theriologica* 38(4): 453-456.
- NEELANARAYANAN, P., R. NAGARAJAN & R. KANAKASABAI (1996): Burrow morphology of field rodents in cauvery delta. *J. Bombay Nat. Hist. Soc.* 93: 238-241.
- PRAKASH, I. & R.P. MATHUR (1987): Management of Rodent Pests. Indian Council of Agricultural Research, New Delhi. 133 pp.
- PRAKASH, I., C.G. KUMBAKARANI & A. KRISHNAN (1965): Eco-toxicology and Control of Indian desert gerbil, *Meriones hurrianae* (Jerdon) *J. Bombay Nat. Hist. Soc.* 62: 237-244.
- PRATER, S.H. (1971): The Book of Indian Animals (Eleventh impression). Bombay Natural History Society, Mumbai. 324 pp.
- PARSHAD, V.R. & R.S. TRIPATHI (2004): Soil ecology and rodents. *Rodent Newsletter* 28(1-2): 2-3.
- SIVAPRAKASAM, C. & G. DURAIRAJ (1995): Burrow ecology of four rice field Rodents of Tamil Nadu, India. *International Journal of Ecology and Environment Sciences* 21: 231-239.
- SONI, B.K. & M. IDRIS (2005): Burrowing behaviour of rodents in rocky habitats in arid zone. *Rodent Newsletter* 29(1-4): 7-8.
- URS, Y.L. (1968): Habits and Habitats of rodents. Pp. 25-35. In: Majumdar, S.K. (Ed.): Manual of Rodent Control. Central Food Technological Research Institute, Mysore.

3. DISTRIBUTION AND STATUS OF THE WILD WATER BUFFALO *BUBALUS ARNEE* IN BHUTAN

ANWARUDDIN CHOUDHURY¹

¹The Rhino Foundation for Nature in NE India, c/o Assam Co. Ltd., Bamunimaidam, Guwahati 781 021, Assam, India.
Email: badru1@sancharnet.in, badru1@sify.com

The Asiatic Wild Water Buffalo *Bubalus arnee* Kerr (*bubalis* Linn.), henceforth Wild Water Buffalo, is a globally threatened species and has been listed as 'Endangered' (IUCN 2007). Once widespread over large parts of South and South-east Asia, this rare bovine is now mainly confined to north-eastern India with small numbers in Nepal and Indo-China (Corbet and Hill 1992; Choudhury 1994). The occurrence in southern Bhutan has been mentioned by Blower (1986), Choudhury (1994) and Wangchuk *et al.* (2004).

I had visited parts of southern Bhutan since October 1985 (not frequently); from September 2004 to June 2007, I made frequent visits as part of my official work as Deputy Commissioner of Baksa district in Assam (having common border with Bhutan). During these visits, I had the opportunity to observe wild buffaloes. In this note, the distribution, habitat and status of the wild water buffalo in Bhutan have been discussed.

Bhutan being mountainous does not have much habitat for the Wild Water Buffalo, which requires grassland with water bodies, preferably on flat terrain. Owing to its occurrence in the Manas National Park in Assam, India (Gee 1964; Choudhury 1994), which is located on the international boundary, there was always chance of animals' crossing over. The observations made so far indicates that there are nine areas in Bhutan where the Wild Water Buffalo is still seen or seen till the recent past. These are: (1) Gabhorukunda (Gobarkanda) (26° 46'-48' N; 90°49-53' E), (it is not a point location but a stretch of grassy area) (2) Mathanguri (Matharguri) (26° 47' N; 90° 58' E), (3) Nunmati (26° 47' N; 90° 59' E), (4) Rabang nullah (26° 49' N; 91° 04' E), (5) East of Doimari (26° 49' N; 91° 06' E), (6) Kukulong (26° 47' N; 90° 45' E), (7) Kalamati (26° 47' N; 90° 40' E), (8) Saralbhanga (26° 52' N; 90° 15' E) and (9) Jamduar (26° 44' N; 89° 52' E).



Fig. 1: Map of Bhutan showing the main features and the places mentioned in the text

Blower (1986) saw a small herd in Gabhorukunda area in September 1985. During my several visits to Gabhorukunda in 2006 and 2007, I saw footprints of lone bulls as well as small herds. The Forest Department staff and conservation volunteers of Assam's Manas National Park had reportedly observed several lone bulls and 2-3 herds totalling 20-30 animals during the same period. A census operation carried out jointly by the Project Tiger authorities and Rhino Foundation for Nature in NE India (NGO) on April 16-17, 2008, had counted 32 animals in three herds in Gabhorukunda area on the Indian side (Choudhury *et al.* 2008). Although the Bhutan side of Gabhorukunda was outside the purview of census operation, bulk of the area was visible and no buffalo could be seen. On the Bhutan side of Gabhorukunda, the animals mostly go for water as water bodies are limited in this Bhabar tract. There is water in the river only at the spot where it debouched onto the flat ground and the buffaloes visit the site normally after sunset. Daytime sightings are rare. The local reports by Forest staff and old hunters indicated that during the disturbed period in Manas for a decade from 1989 onwards (Choudhury 1989, 2006), many buffaloes were killed by poachers in Gabhorukunda area; the animals still avoid the wide open area with no cover during daytime. The animals also graze along the left bank of the River

Gabhorukunda up to River Suidener, and also early in the morning or after dusk in some areas of the bed where there is grass. This is by far the only habitat of the Wild Buffalo in Bhutan.

At Mathanguri, I had observed a bull on the banks of River Manas in October 1985. Subsequently, one small herd (up to 14 animals) was also sighted on several occasions, besides lone bulls (up to two), in the same area crossing the border to Bhutan only to come back. I observed a small herd of seven animals' at the border on March 09, 2007. Since early 1990s, a buffalo *khuti* (*khuti*=camp) came to the Bhutan side of Mathanguri with several domestic female buffaloes. This prompted a large lone bull to regularly visit the camp everyday. Occasionally one more bull would come nearby, but only one remained with the cows in the *khuti*. This bull is perhaps the only wild buffalo that actually spends bulk of its time inside Bhutan territory.

'Nunmati' is a salt lick towards east of Mathanguri just north of the India-Bhutan international boundary. This was a favourite spot for the Indian One-horned Rhinoceros *Rhinoceros unicornis* till early 1990s when bulk of these pachyderms were eliminated by the poachers from Manas. Lone bulls as well as small herds of wild buffaloes regularly

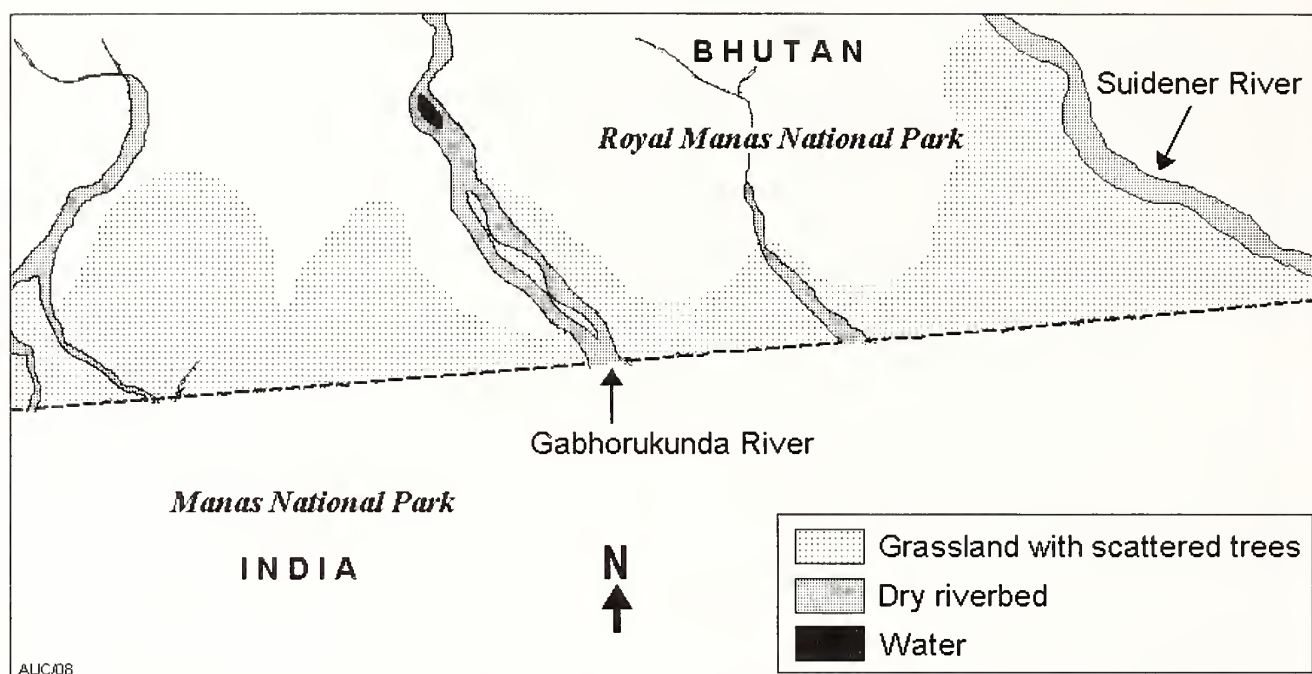


Fig. 2: Gabhorukunda (Gobarkanda) area is the main habitat of Wild Buffalo in Bhutan

visit the site. In fact, they just cross over to Bhutan to the lick and come back.

At Rabang nullah, there is grass on the bed of the river where an occasional animal is seen. Footprints of lone animals were seen in 2006-07 within a kilometre inside Bhutan. Similarly, towards east of Doimari, the animals are occasional visitors although here a patch of grassland is found where till early 1990s, even small herds used to visit.

Towards west of Gabhorukunda there are small tracts of grassland interspersed with trees up to Kukulong river. There is a linear patch along the left bank of Kukulong river, which is occasionally visited by buffaloes. Farther west is another site of salty earth called 'Kalamati' on the Kanamakra river. The buffalo is an occasional visitor to the area, which is on the border.

Farther west, there was no significant grassland till the Saralbhanga and Sankosh rivers. The site where the Saralbhanga river debouches into the plains had some grassland, which, however, is now under human occupation and a township in the form of Sarpang – a district headquarter, has come up in the area. Just south is the border with India where also a large human settlement (Saralpara Forest Village) came up. It was here, i.e., at the international boundary, that three Wild Water Buffaloes out of a herd of six were hunted down by a *shikar* party of the then ruler of Cooch Behar on March 07, 1900 (The Maharajah of Cooch Behar 1908). On the Bhutan side near Jamduar in Assam, the wild buffalo is no longer found (also in Assam area). The last animals were

recorded in 1970s. The animals used to cross over for short distance inside Bhutan, just north and north-east of Jamduar and occasionally crossing the river towards Kalikhola.

From the above it is clear that Bhutan does not have a resident population of Wild Water Buffaloes, mainly because of its limited habitat. However, more than 30 animals could be inside Bhutan at any time (e.g., Gabhorukunda). Till 1989, the local staff and old hunters reported that the number often exceeded 50 when several herds used to loosely congregate for water and grazing. The daily range of the herds and lone bulls that occur in Bhutan spreads over both sides of the border.

The total grassland habitat available for the animal inside Bhutan is little over 10 sq. km (Fig. 1). Bulk of the grassland is located around Gabhorukunda area (Fig. 2). All but two locations are inside Royal Manas National Park while the area near Jamduar is a part of Phipsoo Wildlife Sanctuary.

Poaching for meat was the main reason for killing of Wild Water Buffalo since 1989 (Choudhury 1989, 2006) and the situation worsened when the anti-poaching camp at Gabhorukunda on Assam side was abandoned by staff due to attack by underground extremists. An unspecified number of buffaloes were killed in Gabhorukunda area (both sides of the border) and meat was sold in the markets often mixed up with deer meat (as latter fetches more money).

Situation has improved a lot in Assam's Manas

National Park and there was no significant poaching of buffalo since 2004. On Bhutan side, patrolling has started in recent years thus providing some security. A well-equipped and active anti-poaching camp at Gabhorukunda on the Bhutan side is strongly recommended, which should not be near the water spot (to avoid disturbance to the animals) so that in future the wild buffaloes can be seen again in large herds during daytime coming to the waterbody.

ACKNOWLEDGEMENTS

I thank the following for their help during my visits: Sudhir Vyas (India's Ambassador to Bhutan), *Dasho* Tshering

Wangda (Joint Secretary, Royal Government of Bhutan), Karma Drukpa (Sub-divisional Officer, Panbang), Pema Rinchen (Park Ranger, Royal Manas) and their party, A. Rabha and A. Swargiary (Field Directors, Indian Manas), R. Bhattacharjee and C.R. Bhabora (Deputy Field Directors), late Alauddin Choudhury (father), Dr. Anil Goswami, Range Officers (P. Brahma of Panbari and M. Brahma of Bansbari) and their staff, Mohabbat Shah Ali, Romu Mazumdar, Sajjad Choudhury, Imran Mazumdar (Babu), the volunteers of Manas Panbari Eco-tourism Society, S. Sharma (Assistant Executive Engineer, E & D Department), Hakim (driver), M. Saikia, G. Medhi, Das, Talukdar, Baishya (all of Assam police), Satya Moosahary and his boatmen colleagues.

REFERENCES

- BLOWER, J.H. (1986): Nature conservation in Bhutan: project findings and recommendations. FO: DP/BHU/83/022. FAO, Rome, Italy. 55 pp.
- CHOUDHURY, A.U. (1989): S.O.S. Manas! *The Sentinel*, 7 May.
- CHOUDHURY, A.U. (1994): The decline of the wild water buffalo in north-east India. *Oryx* 28(1): 70-73.
- CHOUDHURY, A.U. (2006): Manas – looking back, looking forward. *Sanctuary Asia* 26(1): 22-29.
- CHOUDHURY, A.U., A. SWARGIARY, C.R. BHOBORA & B. SAIKIA (2008): Census of Wild Water Buffalo in Manas National Park. Final Report. Barpeta Road, India: The Field Directorate, Manas National Park, and Guwahati, India: The Rhino Foundation for Nature in NE India. 14 pp.
- CORBET, G.B. & J.E. HILL (1992): The Mammals of the Indo-Malayan Region: A Systematic Review. Oxford University Press, Oxford, UK. 488 pp.
- GEE, E.P. (1964): The Wild Life of India. Collins, London. 192 pp.
- GREEN, M.J.B. (COMPILED) (1993): Nature Reserves of the Himalaya and the Mountains of Central Asia. IUCN and Oxford University Press, Oxford, UK. 471 pp.
- IUCN (2007): IUCN Red List of Threatened Animals. Gland, Switzerland: IUCN.
- THE MAHARAJAH OF COOCH BEHAR (1908): Big game shooting in eastern and north eastern India (originally published as "Thirty-seven years of big game shooting in Cooch Behar, The Duars & Assam"). Reprint 1985. Delhi: Mittal Publications.
- WANGCHUK, T., P. THINLEY, K. TSHERING, C. THSERING & D. YONTEN (2004): A Field Guide to the Mammals of Bhutan. Thimphu: Department of Forestry, Ministry of Agriculture, Royal Government of Bhutan. 179 pp.

4. TWO NEW RECORDS OF DISTRIBUTION OF FOUR-HORNED ANTELOPE *TETRACERUS QUADRICORNIS*

SANJAY GUBBI¹, RAVI KUMAR² AND B.M. AKARSHA³

¹Wildlife Conservation Society-India Program, Centre for Wildlife Studies, 1669, 16th Main, 31st Cross, Banashankari 2nd Stage, Bengaluru 560 070, Karnataka, India. Email: gubbi@wcsindia.org

²No. 22F, J.D. Layout, Jagalur 577 528, Karnataka, India. Email: draavijlr@hotmail.com

³Department of Agricultural Economics and Social Sciences, Humboldt University of Berlin, Philipp str 13, 10115 Berlin, Germany. Email: bmakarsh@gmail.com

The Four-horned Antelope or Chowsingha *Tetracerus quadricornis* is a lesser known antelope endemic to the Indian subcontinent (Krishna *et al.* 2008), and is one of the six antelope species found in India (Rahmani 2001). It is listed under Schedule I of the Wildlife Protection Act, 1972, and also declared as Vulnerable under the IUCN Red list (IUCN 2008). Rice (1991) carried out a questionnaire survey to assess its range and distribution, and reported the species from 83 sites in India. Further, in a literature review Krishna *et al.* (2009) report it from 104 sites from India. Another study by

Sharma (2006) reports the distribution of Four-horned Antelope from 122 sites. Within Karnataka, it was already confirmed to be found in Nagarahole, Bandipur, Biligiri Rangaswamy Temple sanctuaries and other areas (Karanth 1986; Karanth and Nichols 2000; Sharma 2006; Krishna *et al.* 2008). Here we present two observations of the Four-horned Antelope from areas where it is not reported in previous literature (Karanth 1986; Rice 1991; Karanth and Nichols 2000; Sharma 2006; Krishna *et al.* 2009) in the state of Karnataka.